

Appl. No. 10/507,200
Amdt. Dated April 19, 2007
Reply to Office Action of January 19, 2007

Listing of Claims:

1. (currently amended) An X-ray apparatus which includes:

an X-ray source (2) for the emission of a conical X-ray beam, said beam being wide enough to completely irradiate the X-ray detector in all possible orientations and positions;

an X-ray detector (3) for the multiple detection of the X-rays after their passage through an object to be examined, being arranged along an object axis (4), while the X-ray source (2) and the X-ray detector (3) are displaced along a trajectory; means (12, 14, 15) for changing the position and/or the orientation of the X-ray detector (3) relative to the X-ray source (2); and

a control unit (11) for displacing the X-ray source (2) and the X-ray detector (3) along the trajectory and for controlling, rotationally on a central axis of said beam, orientation of the X-ray detector (3) during the detection of the X-rays.

2. (currently amended) An X-ray apparatus which includes an X-ray source (2) for the emission of a conical X-ray beam, said beam being wide enough to completely irradiate the X-ray detector in all possible orientations and positions;

and an X-ray detector (3) for the multiple detection of the X-rays after their passage through an object to be examined, being arranged along an object axis (4), while the X-ray source (2) and the X-ray detector (3) are displaced along a trajectory, characterized in

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that the apparatus includes means ~~(12, 14, 15)~~ for changing the position and/or the orientation of the X-ray detector (3) relative to the X-ray source (2) and also a control unit (11) for displacing the X-ray source (2) and the X-ray detector (3) along the trajectory and for controlling the position and/or orientation of the X-ray detector (3) during the detection of the X-rays, characterized in that the X ray apparatus includes a flat, rectangular X-ray detector (3) which is rotatable around the connecting line (13) extending between the focal point of the X-ray source (2) and the center of the X-ray detector (3), the control unit (11) for controlling the orientation of the X-ray detector (3) being constructed in such a manner that one of the edges ~~(31, 32)~~ of the X-ray detector (3) is always situated at right angles to the object axis (4) while the trajectory is being completed.

3. (currently amended) An X-ray apparatus as claimed in claim 2, ~~characterized in that wherein~~ for circular trajectories the control unit (11) is arranged to adjust the orientation of the X-ray detector (3) prior to the beginning of the completion of each trajectory in such a manner that one of the edges ~~(31, 32)~~ of the X-ray detector (3) is situated at right angles to the object axis (4) and that the orientation of the X-ray detector (3) is kept constant while the trajectory is being completed.

4. (currently amended) An X-ray apparatus as claimed in claim 2, ~~characterized in that wherein~~ the control unit (11) is arranged to adjust the orientation in response to any change of the position of the X-ray source ~~(2)~~ while a trajectory is being completed.

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5. (currently amended) An X-ray apparatus which includes an X-ray source (2) for the emission of a conical X-ray beam, said beam being wide enough to completely irradiate the X-ray detector in all possible orientations and positions; and an X-ray detector (3) for the multiple detection of the X-rays after their passage through an object to be examined, being arranged along an object axis (4), while the X-ray source (2) and the X-ray detector (3) are displaced along a trajectory, characterized in that the apparatus includes means (12, 14, 15) for changing the position and/or the orientation of the X-ray detector (3) relative to the X-ray source (2) and also a control unit (11) for displacing the X-ray source (2) and the X-ray detector (3) along the trajectory and for controlling the position and/or orientation of the X-ray detector (3) during the detection of the X-rays, characterized in that the means (14, 15) for changing the position and/or the orientation of the X-ray detector (3) are constructed in such a manner that the angle between the central ray (16) of the X-ray beam and the connecting line (13) extending between the focal point of the X-ray source (2) and the center of the X-ray detector (3) can assume a value other than zero, and that the control unit (11) is constructed in such a manner that at least two different angular positions are adjusted during the detection of the X-rays.

6. (currently amended) An X-ray apparatus as claimed in claim 5, ~~characterized in that wherein~~ the X-ray detector (3) is arranged on one or more rails (14) in order to change its position and/or its orientation.

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7. (currently amended) An X-ray apparatus as claimed in claim 6, ~~characterized in that wherein~~ in order to change its position and/or its orientation, the X-ray detector (3) is mounted on a rail (14) which extends essentially perpendicularly to the central ray (16), notably on a rail which is curved around the focal point of the X-ray source (2).

8. (currently amended) An X-ray apparatus as claimed in claim 5, ~~characterized in that wherein~~ the X-ray detector (3) is a flat, rectangular X-ray detector.

9. (currently amended) An X-ray apparatus as claimed in claim 5, ~~characterized in that wherein~~ the control unit (11) is arranged for the multiple displacement of the X-ray source (2) along a trajectory during the irradiation of the object to be examined and for the adjustment of a different angular position of the X-ray detector (3) during each completion of the same trajectory.

10. (currently amended) A method for forming X-ray images, comprising:
emitting, by an X-ray source, a conical X-ray beam for detection, by an X-ray detector, of X-rays after their passage through an object to be examined while the X-ray source and the X-ray detector are displaced along a trajectory, said beam being wide enough to completely irradiate the X-ray detector in all possible orientations and positions; and

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in order to maximize a reconstructable examination zone, moving, during said detection, the X-ray detector so as to off-center position of the X-ray detector from said beam and/or so as to change orientation of the X-ray detector relative to the X-ray source .

11. (previously amended) A computer program product having a computer readable medium in to which is embodied a computer program executable by a computer to perform the method of claim 10.

12. (previously presented) The method of claim 10, further comprising performing said moving off-center on a track.

13. (previously presented) The method of claim 12, wherein said track is curved to maintain the detector facing the source.

14. (previously presented) The method of claim 10, wherein said zone is in the shape of a cylinder.

15. (previously presented) A device for performing the method of claim 10, said device comprising said X ray source, said X ray detector, and a controller for said moving.

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16. (previously presented) The X-ray apparatus of claim 5, including a flat, rectangular X-ray detector configured for rotation around the connecting line extending between the focal point of the X-ray source and the center of the X-ray detector, the control unit for controlling the orientation of the X-ray detector being constructed in such a manner that one of the edges of the X-ray detector is always situated at right angles to the object axis while the trajectory is being completed.

17. (previously presented) The X-ray apparatus of claim 6, including a flat, rectangular, non-square X-ray detector configured for rotation around the connecting line extending between the focal point of the X-ray source and the center of the X-ray detector, the control unit for controlling the orientation of the X-ray detector being constructed in such a manner that one of the edges of the X-ray detector is always situated at right angles to the object axis while the trajectory is being completed.

18. (previously presented) The X-ray apparatus of claim 7, including a flat, rectangular X-ray detector configured for rotation around the connecting line extending between the focal point of the X-ray source and the center of the X-ray detector, the control unit for controlling the orientation of the X-ray detector being constructed in such a manner that one of the edges of the X-ray detector is always situated at right angles to the object axis while the trajectory is being completed.

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19. (previously presented) The X-ray apparatus of claim 8, including a flat, rectangular, non-square X-ray detector configured for rotation around the connecting line extending between the focal point of the X-ray source and the center of the X-ray detector, the control unit for controlling the orientation of the X-ray detector being constructed in such a manner that one of the edges of the X-ray detector is always situated at right angles to the object axis while the trajectory is being completed.

20. (previously presented) The X-ray apparatus of claim 9, including a flat, rectangular X-ray detector which is rotatable around the connecting line extending between the focal point of the X-ray source and the center of the X-ray detector, the control unit for controlling the orientation of the X-ray detector being constructed in such a manner that one of the edges of the X-ray detector is always situated at right angles to the object axis while the trajectory is being completed.